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Newfoundland and Labrador Region
Canadian Science Advisory Secretariat
Science Advisory Report 2013/077

STOCK ASSESSMENT OF NAFO SUBDIVISION 3PS WITCH FLOUNDER

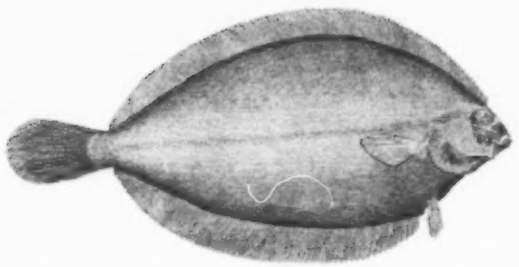

Image: Witch Flounder (Glyptocephalus cynoglossus)

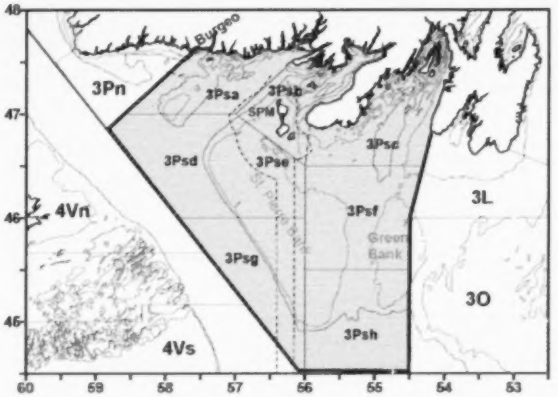

Figure 1. 3Ps management area (shaded) unit areas (solid lines) and economic zone around the French islands of St. Pierre and Miquelon (SPM) (dashed line)

Context

Witch Flounder (Glyptocephalus cynoglossus) is a deepwater flatfish that reaches its northern limit of distribution in the Northwest Atlantic near Hamilton Bank off southern Labrador and extends as far south as the east coast of the southern United States of America (USA). In the Northwest Atlantic Fisheries Organization (NAFO) Subdivision 3Ps, it is primarily distributed along the slope around St. Pierre Bank and in through Hermitage Channel off Hermitage, Connaigre and Fortune Bays on Newfoundland's South Coast.

It is a long-lived, slow growing species and has been aged at well over 20 years, however, the number of age groups comprising the Witch Flounder stock in Subdivision 3Ps has been reduced substantially since the mid-1970s. Fish older than 13 years were rarely seen in either the commercial or survey catches by the early 1990s.

Spawning occurs over a protracted period usually extending from March to September for most areas of the Northwest Atlantic. However, in Subdivision 3Ps, spawning takes place earlier than in other areas, with highest intensity during January-March. Spawning concentrations can be found along the slope of St. Pierre Bank especially in Halibut Channel, where and when most offshore commercial fishing occurs and catch rates are generally highest.

The present assessment is the result of a request for science advice from the Fisheries Management Branch (NL Region). The main objective was to evaluate the status of the stock. Participants included Fisheries and Oceans Canada (DFO) scientists, a scientist from the French Research Institute for Exploitation of the Sea (IFREMER, France), fisheries managers, academia, government officials from the province of Newfoundland and Labrador, and fishing industry representatives from both Canada and France.

This Science Advisory Report is from the October 15-18, 2013 3Ps Cod and Witch Flounder Stock Assessment. Additional publications from this meeting will be posted on the DFO Science Advisory Schedule as they become available.

SUMMARY

- Information available to evaluate stock status consisted of commercial landings data (1974-2013) and information from Canadian research vessel (RV) trawl surveys (1983-2013).
- The average annual landings for the past ten years were 375 t, about 35% of the 1986-1993 average of 1100 t and well below the 650 t Total Allowable Catch (TAC).
- Size compositions from the fishery have changed relatively little from 2007-2013.
- The mean RV biomass index over 2008-13 has been relatively stable at 15% below the time-series average.
- Pre-recruit (16-30 cm) abundance from the RV survey showed no trend from 1997-2013.

BACKGROUND

Species Biology

The age structure of the Witch Flounder population, as determined from DFO RV survey data (up to 1994) and the Groundfish Enterprise Allocation Council (GEAC) (1998-2004) survey data was relatively stable from 1983-94. There was also little apparent change in growth pattern over that period. Recent growth and age structure is unavailable as aging has not been conducted since 1994. As a slow growing, long lived flatfish, it is difficult to track Witch Flounder cohorts through the available length frequency information.

The Fishery

Landings of Witch Flounder in Subdivision 3Ps generally fluctuated between 200 and 1000 t annually since the early 1970s (Fig. 2). During the past ten years annual landings averaged just 375 t, well below the 650 t TAC and about 35% of the average catch from 1986-93 (1100 t). Catches during the 1980s were primarily by-catch from other groundfish fisheries, although a short seasonal directed fishery often occurred.

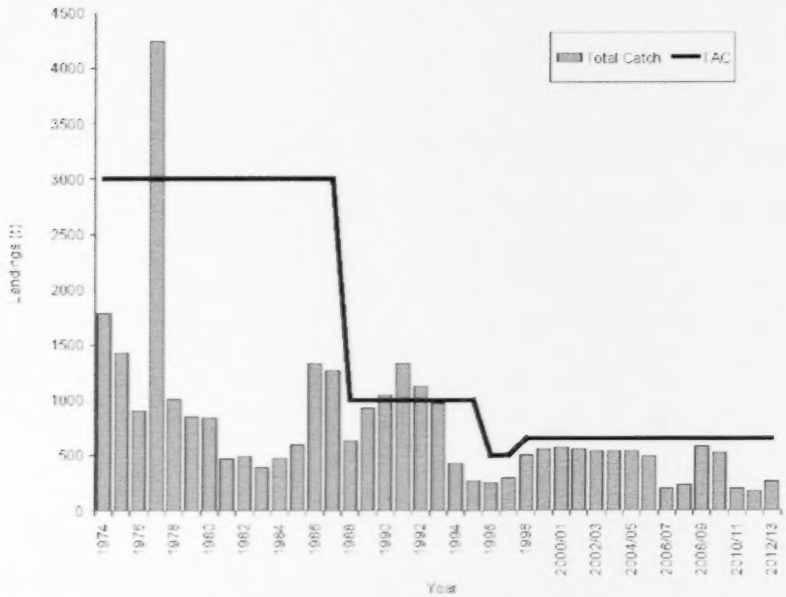

Figure 2. Landings and TACs during 1974-2012/13. Management changed from calendar year to management year (April 1- March 31) in 2000.

Landings have been mainly by Canadian trawlers fishing offshore along the southern slope of St. Pierre Bank. However, a significant portion of the landings is taken also by small Scottish/Danish seiners (up to 50% annually over the past 5 years) and, to a lesser extent, gill-netters fishing primarily in Hermitage Channel near the Newfoundland south coast bays. Fishermen from St. Pierre and Miquelon also catch small amounts of Witch Flounder on St. Pierre Bank.

The fishing pattern for offshore Canadian participants has changed little since about 1993, with operations being conducted mostly at the south-eastern tip of St. Pierre Bank. Although traditionally the otter trawl catches of Witch Flounder have been taken primarily in depths of about 200-400 meters (109-219 fathoms), more recently the fishery has taken place mainly in very deep water to at least 900 meters (492 fathoms).

Size compositions from the commercial catch have changed relatively little from 2007-13 and were similar to those seen in the previous assessment of this stock (2005). Most of the annual Witch Flounder catches were comprised of fish in the range of 35-50 cm with modes mostly in the range of 40-43 cm.

American Plaice by-catch in the otter trawl directed Witch Flounder fishery ranged from 70% to 100% of the witch catch in 2000-02, but decreased in recent years, and was only about 10% in 2011/12. By-catch of American Plaice in the Danish seine fishery for witch has been low (less than 10%) in most years.

ASSESSMENT

Research Vessel Spring Survey (1983-2013)

Age data from the fishery and DFO RV surveys have not been available since 1994. This precludes the use of any age-based assessment tools to evaluate important stock parameters, for example, mortality, growth, and maturity rates.

Although survey stock size indices are highly variable (Fig. 3) the indices of abundance and biomass from the RV survey have been relatively stable since about 1995. The biomass index during recent years (2008-13) has remained relatively stable and was on average about 15% lower than the time series mean, while average abundance during the same time period remained near the series mean. Survey coverage was expanded in 1997 to cover additional strata in the inshore area. The survey series means were adjusted to account for the potential underestimation of biomass from 1983-96. The 2006 survey was incomplete.

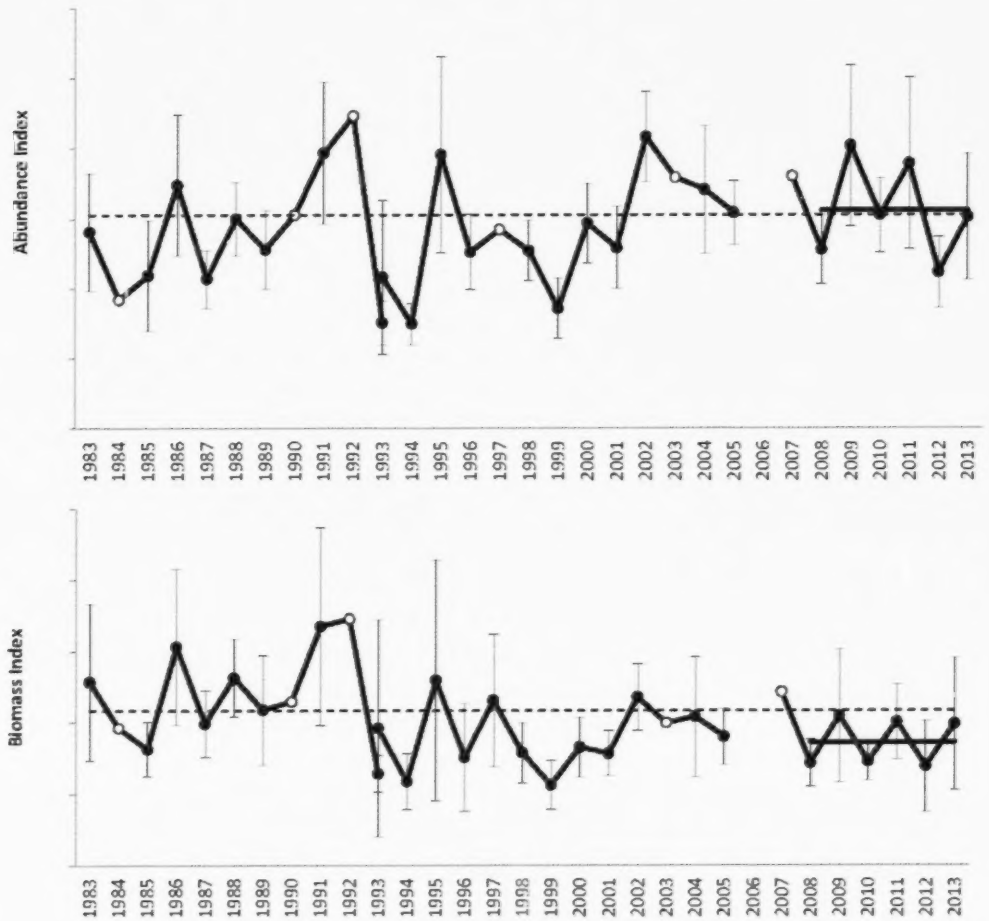

Figure 3. Abundance and biomass indices from DFO RV survey. Dashed horizontal lines are series means adjusted for less survey coverage in the early part of the time series (1983-96); solid horizontal lines are 2008-13 means. Hollow symbols indicate negative confidence limit; 2006 survey was incomplete.

To examine recruitment trends, indices of abundance of fish from 16 to 30 cm were evaluated from RV survey data (Fig. 4). In 2002-04 and 2009-11 there were higher than average numbers of these pre-recruit sized fish. In the 2012 and 2013 surveys, the abundance of witch in this size range was below the time-series average. Although the relationship between this size group and future exploitable biomass is unclear, overall, the pre-recruit (16-30 cm) abundance index showed no trend from 1997-2013.

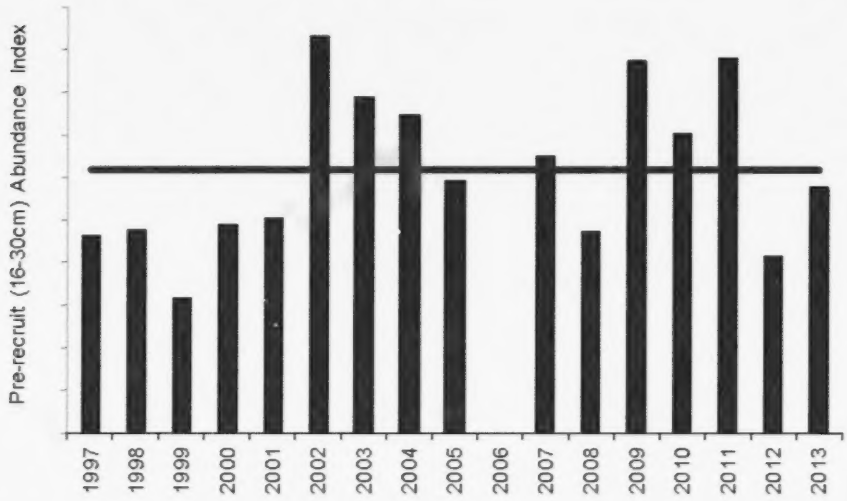

Figure 4. Pre-recruit (16-30 cm) abundance index from spring surveys during 1997-2013 (horizontal line is the time-series average; 2006 survey was incomplete).

Sources of Uncertainty

Otoliths have not been aged since 1994. This precludes the use of an age-based analytical assessment and also makes it difficult to track cohorts through the RV survey data series.

Stakeholder Perspectives

The 3Ps Witch Flounder (greysole) fishery continues to be important to the sector both as a directed species and as a by-catch in other fisheries. In recent years catches have been well below quotas for several reasons. Several wetfish vessels which were key suppliers of greysole to shore based facilities were sold and decommissioned; suitable replacement vessels with the operational experience and equipment to fish greysole have been difficult to find; DFO has implemented management measures to reduce the capture of American Plaice and cod particularly during the cod spawning closure; and in general because of shore-based operational issues, all these factors contributed to the low landings relative to quotas. Despite these operational issues the fishery (fish sizes, seasonality, fishing areas and catch rates) continues to be consistent from year to year.

As well, catches of 3Ps greysole by the seine fleet over recent years have been below quota levels. One of the main reasons for the reduced catch is management measures by DFO to minimize the by-catch of redfish.

CONCLUSIONS AND ADVICE

Recent (2008-13) biomass estimates from RV surveys were relatively stable and averaged about 15% below the 1983-2013 mean. Over the same time period, the average abundance index was near the series mean. Long-term stability (since about 1995) in both abundance and biomass indices and no discernible trends in recruitment or geographic distribution suggest that the stock is able to sustain recent levels of catch. However, the stock has not increased even with low levels of landings.

OTHER CONSIDERATIONS

Temperature and Physical Oceanography

Oceanographic information collected during the spring DFO RV surveys indicated that near-bottom temperatures throughout NAFO subdivision 3Ps have been warming during the past decade reaching two standard deviations above normal in 2011 and 2012 before decreasing to one standard deviation above normal in 2013. The areal extent of bottom water with temperatures >3°C has remained relatively constant at about 50% of the total 3P area, although actual temperature measurements show considerable inter-annual variability. The current conditions are comparable to those of the late 1970s and early 1980s. The effect of these environmental conditions on the Witch Flounder stock is unknown.

Ecosystem considerations

The marine ecosystem in NAFO Subdivision 3Ps is open and dynamic, subject to influences from neighbouring systems like the Grand Bank, the Gulf of St. Lawrence and the Scotian Shelf. Furthermore, several fish species in 3Ps are at or near the limits of their distributions, so changes in distributional ranges (e.g. northerly expansions of warmer water species associated with warming conditions), would be expected to be more noticeable and influential in this ecosystem than in more northern ecosystems.

The fish community in 3Ps declined during the mid-1980s and early 1990s and was accompanied by a decrease in the average fish size. Since the mid-1990s, the overall biomass and abundance of the fish community has increased. The overall biomass increase has been moderate, but the increase in abundance has been clear, and led by planktivorous fishes. On the environmental side, this region has been experiencing an important warming trend since the early 1990s, with bottom temperatures during the spring survey increasing at a rate around 3% per year. The observed warming of this system, together with recent increases of "warmer-water" species like sandlance, and silver hake suggests that this ecosystem could be undergoing structural changes.

SOURCES OF INFORMATION

This Science Advisory Report is from the October 15-18, 2013 Regional Peer Review Process for Subdivision 3Ps Cod and Witch Flounder. Additional publications from this meeting will be posted on the Fisheries and Oceans Canada (DFO) Science Advisory Schedule as they become available.

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Centre for Science Advice (CSA)
Newfoundland and Labrador Region
Fisheries and Oceans Canada
PO BOX 5667
St. John's NL A1C 5X1

Telephone: (709) 772-3332
Fax: (709) 772-6100
E-Mail: DFONLCentreforScienceAdvice@dfo-mpo.gc.ca
Internet address: www.dfo-mpo.gc.ca/csas-sccs/

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